

BCSE103E -
Computer Programming: Java
Digital Assignment – 1

Name: Dhruv Rajeshkumar Shah
Registration No – 21BCE0611

1. Write a java program to check the Minimum and Maximum range of all the 8 primitive data types?

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

class DataSizeRange {
    public static void main(String[] args) {
        // Byte
        System.out.println("Long Min: " + Long.MIN_VALUE +
            "\nMax: " + Long.MAX_VALUE +
            "\nBytes: " + Long.BYTES);
        System.out.println();

        // Short
        System.out.println("Short \nMin: " + Short.MIN_VALUE +
            "\nMax: " + Short.MAX_VALUE +
            "\nBytes: " + Short.BYTES);
        System.out.println();

        // Integer
        System.out.println("Int \nMin: " + Integer.MIN_VALUE +
            "\nMax: " + Integer.MAX_VALUE +
            "\nBytes: " + Integer.BYTES);
        System.out.println();

        // Long
        System.out.println("Long \nMin: " + Long.MIN_VALUE +
            "\nMax: " + Long.MAX_VALUE +
            "\nBytes: " + Long.BYTES);
        System.out.println();

        // Float
        System.out.println("Float \nMin: " + Float.MIN_VALUE +
            "\nMax: " + Float.MAX_VALUE +
            "\nBytes: " + Float.BYTES);
        System.out.println();

        // Double
        System.out.println("Double \nMin: " + Double.MIN_VALUE +
            "\nMax: " + Double.MAX_VALUE +
            "\nBytes: " + Double.BYTES);
        System.out.println();
    }
}
```

```
// Character
System.out.println("Character \nMin: " + Character.MIN_VALUE +
    "\nMax: " + Character.MAX_VALUE +
    "\nBytes: " + Character.BYTES);
System.out.println();

// Boolean
System.out.println("Boolean \nMin: " + Boolean.TRUE +
    "\nMax: " + Boolean.FALSE);
}
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
$ cd c:\\Dhruv\\VIT\\Semester-3\\Java\\Lab\\DA-1 ; /usr/bin/env C:\\Pr
v\\AppData\\Roaming\\Code\\User\\workspaceStorage\\693b2ac8aa2bac9d61fc
e
Long Min: -9223372036854775808
Max: 9223372036854775807
Bytes: 8

Short
Min: -32768
Max: 32767
Bytes: 2

Int
Min: -2147483648
Max: 2147483647
Bytes: 4

Long
Min: -9223372036854775808
Max: 9223372036854775807
Bytes: 8

Float
Min: 1.4E-45
Max: 3.4028235E38
Bytes: 4

Double
Min: 4.9E-324
Max: 1.7976931348623157E308
Bytes: 8

Character
Min:
Max: ?
Bytes: 2

Boolean
Min: true
Max: false
```

2. Java variable declaration

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class Variable {
    public static void main(String[] args) {
        long hoursWorked = 40;
        double payRate = 25.0, taxRate = 0.10, taxPayable;

        System.out.println("Hours Worked: " + hoursWorked);
        System.out.println("Payment Amount: " + (hoursWorked * payRate));

        taxPayable = hoursWorked * payRate * taxRate;
        System.out.println("Tax Payable: " + taxPayable);
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
ceStorage\\693b2ac8aa2bac9d61fc6a23765304b0\\redhat.java\\
Hours Worked: 40
Payment Amount: 1000.0
Tax Payable: 100.0
```

3. Default values of variables

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class DefaultValues {
    // Declaring primitive data types
    byte byte1;
    short short1;
    int int1;
    long long1;
    float float1;
    double double1;
    char char1;
    boolean boolean1;

    // Declaring reference data types
    String string1;
    DefaultValues defaultValues1;

    // Method for printing default values
    public void getDefaultValues() {
        System.out.println("Default value of byte: " + byte1);
        System.out.println("Default value of short: " + short1);
        System.out.println("Default value of int: " + int1);
        System.out.println("Default value of long: " + long1);
        System.out.println("Default value of float: " + float1);
        System.out.println("Default value of double: " + double1);
        System.out.println("Default value of char: " + char1);
        System.out.println("Default value of boolean: " + boolean1);
        System.out.println("Default value of String: " + string1);
        System.out.println("Default value of DefaultValues: " +
defaultValues1);
    }

    public static void main(String[] args) {
        DefaultValues object = new DefaultValues();
        object.getDefaultValues();
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
$ cd c:\\Dhruv\\VIT\\Semester-3\\Java\\Lab\\DA-1 ; /usr/bin/env C:\\
v\\AppData\\Roaming\\Code\\User\\workspaceStorage\\693b2ac8aa2bac9d61
s
Default value of byte: 0
Default value of short: 0
Default value of int: 0
Default value of long: 0
Default value of float: 0.0
Default value of double: 0.0
Default value of char:
Default value of boolean: false
Default value of String: null
Default value of DefaultValues: null
```

4. Local Variables

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class LocalVariable {
    public class EmployeeSalary {

        public void getSalary() {
            // Declaring local variable
            double salary;

            // Declaring and initializing local variables
            int workingDays = 25, salaryPerDay = 1000;

            // Initializing local variable
            salary = workingDays * salaryPerDay;

            // Printing local variable
            System.out.println("Salary of the employee: " + salary);
        }
    }

    public static void main(String[] args) {
        LocalVariable object = new LocalVariable();
        EmployeeSalary employeeSalary = object.new EmployeeSalary();

        // Viewing local variable salary by calling the method it was declared in
        employeeSalary.getSalary();
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
$ /usr/bin/env C:\\Program\\ Files\\Java\\jdk-11.0.11\\bin\\java.exe -cp
\\693b2ac8aa2bac9d61fc6a23765304b0\\redhat.java\\jdt_ws\\DA-1_b95285c5\\b
Salary of the employee: 25000.0
```


5. Instance variable

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class InstanceVariable {

    public class AreaOfShapes {
        // Declaring instance variables
        double breadth;
        double length;
        double areaOfRectangle;
        double areaOfSquare;
    }

    public static void main(String[] args) {
        InstanceVariable object = new InstanceVariable();

        // Creating new object of AreaOfShapes class
        AreaOfShapes rectangle1 = object.new AreaOfShapes();

        // Initializing instance variables
        rectangle1.breadth = 10;
        rectangle1.length = 20;
        rectangle1.areaOfRectangle = rectangle1.breadth * rectangle1.length;

        // Displaying instance variables
        System.out.println("Length of rectangle: " + rectangle1.length);
        System.out.println("Breadth of rectangle: " + rectangle1.breadth);
        System.out.println("Area of rectangle: " +
rectangle1.areaOfRectangle);

        System.out.println();

        // Creating second object of AreaOfShapes class
        AreaOfShapes square1 = object.new AreaOfShapes();

        // Initializing instance variables
        square1.breadth = 10;
        square1.length = 10;
        square1.areaOfSquare = square1.breadth * square1.length;

        // Displaying instance variables
        System.out.println("Length of square: " + square1.length);
        System.out.println("Breadth of square: " + square1.breadth);
        System.out.println("Area of square: " + square1.areaOfSquare);
```

```
}  
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)  
$ cd c:\\Dhruv\\VIT\\Semester-3\\Java\\Lab\\DA-1 ; /usr/bin/javac  
v\\AppData\\Roaming\\Code\\User\\workspaceStorage\\693b2ac8\\  
able  
Length of rectangle: 20.0  
Breadth of rectangle: 10.0  
Area of rectangle: 200.0  
  
Length of square: 10.0  
Breadth of square: 10.0  
Area of square: 100.0
```

6. Static variable

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class StaticVariable {
    // Declaring static variables
    public static int marks;

    // Declaring and initializing static variables
    public static String name = "Dhruv";

    public static void main(String[] args) {
        // Accessing static variables without creating object
        StaticVariable.marks = 99;

        System.out.println("Name: " + StaticVariable.name);
        System.out.println("Marks: " + StaticVariable.marks);

        // Creating 3 objects
        StaticVariable obj1 = new StaticVariable();
        StaticVariable obj2 = new StaticVariable();
        StaticVariable obj3 = new StaticVariable();

        // Accessing static variables using objects
        System.out.println("Name of object 1: " + obj1.name);
        System.out.println("Name of object 2: " + obj2.name);
        System.out.println("Name of object 3: " + obj3.name);

        // Accessing static variables directly
        System.out.println("Marks: " + marks);

        // Changing value of static variable using object
        obj1.name = "Dhruv Rajeshkumar Shah";

        // Accessing static variables again
        System.out.println("Name of object 1: " + obj1.name);
        System.out.println("Name of object 2: " + obj2.name);
        System.out.println("Name of object 3: " + obj3.name);

    }
}
```

CODE

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
$ /usr/bin/env C:\\Program\\ Files\\Java\\jdk-11.0.11\\bin\\java.exe -cp C:\\Use
\\693b2ac8aa2bac9d61fc6a23765304b0\\redhat.java\\jdt_ws\\DA-1_b95285c5\\bin Stat
Name: Dhruv
Marks: 99
Name of object 1: Dhruv
Name of object 2: Dhruv
Name of object 3: Dhruv
Marks: 99
Name of object 1: Dhruv Rajeshkumar Shah
Name of object 2: Dhruv Rajeshkumar Shah
Name of object 3: Dhruv Rajeshkumar Shah
```

7. Program to find the Data type detail how the value is stored in machine

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class DataTypeDetails {
    public static void main(String[] args) {
        int x = -5; // 5
        System.out.println(Integer.toBinaryString(x));
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
$ cd c:\\Dhruv\\VIT\\Semester-3\\Java\\Lab\\DA-1 ; /usr/bin/cv\\AppData\\Roaming\\Code\\User\\workspaceStorage\\693b2ac8aa
ils
111111111111111111111111111111111011
```

8. Program to print Unicode

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class Unicode {
    public static void main(String[] args) {
        for (char c = 0x0370; c <= 0x03FF; c++)
            System.out.println(c + " ");
    }
}
```

OUTPUT

P R T T ' ' и и □ □ џ џ ; J □ □ □ ' - A • E H T □ □ □ Y Ω I ◈ B Γ Δ E Z H Θ I K Λ M N Ξ O Π P □ Σ T Y Φ X Ψ Ω I Y Ḳ ē ḡ (U Ḳ β γ δ
 ε ζ η θ ι κ λ μ ν ξ ο π ρ σ τ υ φ χ ψ ω i ŭ ó ú ħ ħ ◈ Y Y Y φ ω χ ρ σ ς F F H γ γ γ Ш Щ Ч Ъ Ы Э В Z X x б в е ф т х ◈ с j џ џ е э в р
 с м р џ џ џ

9. Write a program to display Devanagari alphabets

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class Devnagri {
    public static void main(String[] args) {
        for (char c = 0x0905; c <= 0x0935; c++)
            System.out.print(c + " ");
    }
}
```

OUTPUT

```
अ आ इ ई उ ऊ ऋ ॠ ए ऐ ओ औ क ख ग घ ङ च छ ज झ ञ ट ठ ड ढ ण त थ द ध न प फ ब भ म य र र
ल ळ ॡ व
```

10. Program Showing all the integer literals

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class LiteralIntegers {
    public static void main(String[] arg) {
        int decimalInt = 1234;
        int octalInt = 077;
        int hexaInt = 0x1ff2;
        int binInt = 0b1010101;
        System.out.println("This is a Decimal Literal: " + decimalInt);
        System.out.println("This is an Octal Literal: " + octalInt);
        System.out.println("This is a Hexa Decimal Literal: " + hexaInt);
        System.out.println("This is a Binary Literal: " + binInt);
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
$ /usr/bin/env C:\Program Files\Java\jdk-11.0.11\bin
\\693b2ac8aa2bac9d61fc6a23765304b0\redhat.java\jdt_ws\
This is a Decimal Literal: 1234
This is an Octal Literal: 63
This is a Hexa Decimal Literal: 8178
This is a Binary Literal: 85
```

11. Floating literals

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class LiteralFloat {
    public static void main(String[] arg) {
        float valFloat = 1.7732f;
        double doubleFloat = 1.7732d;
        float expFloat = 123E4f;
        System.out.println("This is a Floating Point Literal: " + valFloat);
        System.out.println("This is a Decimal Literal: " + doubleFloat);
        System.out.println("This is an Exponential Literal: " + expFloat);
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
$ cd c:\\Dhruv\\VIT\\Semester-3\\Java\\Lab\\DA-1 ; /usr/bin/ls
v\\AppData\\Roaming\\Code\\User\\workspaceStorage\\693b2ac8

This is a Floating Point Literal: 1.7732
This is a Decimal Literal: 1.7732
This is an Exponential Literal: 1230000.0
```

12. Boolean literals

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class LiteralBoolean {
    public static void main(String[] arg) {
        boolean bool1 = true;
        boolean bool2 = false;
        System.out.println("This is a boolean true literal: " + bool1);
        System.out.println("This is a boolean false literal: " + bool2);
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
$ cd c:\\Dhruv\\VIT\\Semester-3\\Java\\Lab\\DA-1 ; /usr/bin/ls
v\\AppData\\Roaming\\Code\\User\\workspaceStorage\\693b2a
an
This is a boolean true literal: true
This is a boolean false literal: false
```

13. Character literals

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class CharacterLiteral {
    public static void main(String[] args) {
        char character = 'd';
        char unicodeCharacter = '\u0064';
        System.out.println("This is Character literal: " + character);
        System.out.println("This is unicode character literal: " +
unicodeCharacter);
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
$ /usr/bin/env C:\\Program\\ Files\\Java\\jdk-11.0.11\\b
\\693b2ac8aa2bac9d61fc6a23765304b0\\redhat.java\\jdt_ws\\
This is Character literal: d
This is unicode character literal: d
```

14. String literals

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class LiteralString {
    public static void main(String[] arg) {
        String str1 = "Dhruv";
        String str2 = "Shah";
        System.out.println("This is a String literal: " + str1);
        System.out.println("This is a String literal: " + str2);
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
ceStorage\\693b2ac8aa2bac9d61fc6a23765304b0\\redhat.java\
This is a String literal: Dhruv
This is a String literal: Shah
```


15. Increment

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class Increment {
    public static void main(String[] args) {
        int x = 5, y, z;
        // Post increment
        y = x++;
        System.out.println("Post increment: " + x + " " + y);

        // Pre increment
        z = ++x;
        System.out.println("Pre increment: " + x + " " + z);

        // Float increment
        float f = 5.5f;
        f++;
        System.out.println("Float increment: " + f);

        // Character increment
        char c = 'a';
        c++;
        System.out.println("Character increment: " + c);

        // Byte increment
        byte b = 5;
        b++;
        System.out.println("Byte increment: " + b);
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
$ cd c:\\Dhruv\\VIT\\Semester-3\\Java\\Lab\\DA-1 ; /usr/bin/
v\\AppData\\Roaming\\Code\\User\\workspaceStorage\\693b2ac8
Post increment: 6 5
Pre increment: 7 7
Float increment: 6.5
Character increment: b
Byte increment: 6
```

16. Bitwise operations

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class BitwiseOperations {
    public static void main(String[] args) {
        int x = 0b1010;
        int y = 0b0110;

        // Bitwise AND
        System.out.println("Bitwise AND: " + (x & y));

        // Bitwise OR
        System.out.println("Bitwise OR: " + (x | y));

        // Bitwise XOR
        System.out.println("Bitwise XOR: " + (x ^ y));

        // Bitwise NOT
        System.out.println("Bitwise NOT: " + (~x));

        // Left shift
        System.out.println("Left shift: " + (x << 1));

        // Right shift
        System.out.println("Right shift: " + (x >> 1));
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
ceStorage\693b2ac8aa2bac9d61fc6a23765304b0\redhat.java\j
Bitwise AND: 2
Bitwise OR: 14
Bitwise XOR: 12
Bitwise NOT: -11
Left shift: 20
Right shift: 5
```

15. Scanner

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

import java.util.Scanner;

public class Keyboard {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);

        // Scanning different types of input

        // String
        System.out.println("Enter a string");
        String str = sc.nextLine();
        System.out.println("String: " + str + "\n");

        // Character
        System.out.println("Enter a character");
        char ch = sc.next().charAt(0);
        System.out.println("Character: " + ch + "\n");

        // Integer
        System.out.println("Enter an integer");
        int num = sc.nextInt();
        System.out.println("Integer: " + num + "\n");

        // Float
        System.out.println("Enter a float");
        float f = sc.nextFloat();
        System.out.println("Float: " + f + "\n");

        // Boolean
        System.out.println("Enter a boolean");
        boolean b = sc.nextBoolean();
        System.out.println("Boolean: " + b + "\n");

        // Byte
        System.out.println("Enter a byte");
        byte by = sc.nextByte();
        System.out.println("Byte: " + by + "\n");

        // Binary
        System.out.println("Enter a number in binary");
        int bin = sc.nextInt(2);
        System.out.println("Binary: " + bin + "\n");
    }
}
```

```
}  
  
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)  
$ cd c:\\Dhruv\\VIT\\Semester-3\\Java\\Lab\\DA-1 ; /usr/bin/env C:\\Progr  
v\\AppData\\Roaming\\Code\\User\\workspaceStorage\\693b2ac8aa2bac9d61fc6a  
Enter a string  
Dhruv  
String: Dhruv  
  
Enter a character  
d  
Character: d  
  
Enter an integer  
10  
Integer: 10  
  
Enter a float  
10.10  
Float: 10.1  
  
Enter a boolean  
true  
Boolean: true  
  
Enter a byte  
0  
Byte: 0  
  
Enter a number in binary  
1010  
Binary: 10
```

17. Area of triangle

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

import java.util.Scanner;

public class Triangle {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int a, b, c;
        double s, area;
        System.out.println("Enter 3 Sides of a Triangle");
        a = sc.nextInt();
        b = sc.nextInt();
        c = sc.nextInt();
        s = (a + b + c) / 2f;
        area = Math.sqrt(s * (s - a) * (s - b) * (s - c));
        System.out.println("Area of Triangle is : " + area);
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
ceStorage\\693b2ac8aa2bac9d61fc6a23765304b0\\redhat.java\\jdt_
Enter 3 Sides of a Triangle
4
5
7
Area of Triangle is : 9.797958971132712
```

18. Quadratic equation

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

import java.util.Scanner;

public class QuadraticEquation {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        double a, b, c, d, r1, r2;
        System.out.println("Enter the value of a, b and c");
        a = sc.nextDouble();
        b = sc.nextDouble();
        c = sc.nextDouble();
        d = (b * b) - (4 * a * c);
        if (d > 0) {
            r1 = (-b + Math.sqrt(d)) / (2 * a);
            r2 = (-b - Math.sqrt(d)) / (2 * a);
            System.out.println("Roots are real and distinct");
            System.out.println("Root 1: " + r1);
            System.out.println("Root 2: " + r2);
        } else if (d == 0) {
            r1 = r2 = -b / (2 * a);
            System.out.println("Roots are real and equal");
            System.out.println("Root 1: " + r1);
            System.out.println("Root 2: " + r2);
        } else {
            System.out.println("Roots are imaginary");
        }
    }
}
```

OUTPUT

```
v\\AppData\\Roaming\\Code\\User\\workspaceStorage
ation
Enter the value of a, b and c
1
0
4
Roots are imaginary

dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1
$ cd c:\\Dhruv\\VIT\\Semester-3\\Java\\Lab\\DA-1
v\\AppData\\Roaming\\Code\\User\\workspaceStorage
ation
Enter the value of a, b and c
1
0
-4
Roots are real and distinct
Root 1: 2.0
Root 2: -2.0
```

19. Cuboid

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

import java.util.Scanner;

public class Cuboid {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int length, breadth, height;
        int totalArea, volume;
        System.out.println("Enter length, breadth and height");
        length = sc.nextInt();
        breadth = sc.nextInt();
        height = sc.nextInt();
        totalArea = 2 * (length * breadth + length * height + breadth *
height);
        volume = length * breadth * height;
        System.out.println("Total Area: " + totalArea);
        System.out.println("Volume :" + volume);
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
$ /usr/bin/env C:\\Program\\ Files\\Java\\jdk-11.0.11\\bin\\ja
\\693b2ac8aa2bac9d61fc6a23765304b0\\redhat.java\\jdt_ws\\DA-1_
Enter length, breadth and height
5
6
2
Total Area: 104
Volume :60
```

20. Operators (Arithmetic, relational, logical, bitwise, assignment)

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

import java.util.Scanner;

public class Operators {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int a, b, c;
        System.out.println("Enter 2 numbers");
        a = sc.nextInt();
        b = sc.nextInt();

        // Arithmetic operators
        c = a + b;
        System.out.println("Sum: " + c);

        c = a - b;
        System.out.println("Difference: " + c);

        c = a * b;
        System.out.println("Product: " + c);

        c = a / b;
        System.out.println("Quotient: " + c);

        c = a % b;
        System.out.println("Remainder: " + c);

        // Relational operators
        System.out.println("a > b: " + (a > b));
        System.out.println("a < b: " + (a < b));
        System.out.println("a >= b: " + (a >= b));
        System.out.println("a <= b: " + (a <= b));
        System.out.println("a == b: " + (a == b));
        System.out.println("a != b: " + (a != b));

        // Logical operators
        System.out.println("a > 0 && b > 0: " + (a > 0 && b > 0));
        System.out.println("a > 0 || b > 0: " + (a > 0 || b > 0));
        System.out.println("!(a > 0): " + !(a > 0));

        // Bitwise operators
        System.out.println("a & b: " + (a & b));
```



```
System.out.println("a | b: " + (a | b));
System.out.println("a ^ b: " + (a ^ b));
System.out.println("~a: " + (~a));
System.out.println("a << 1: " + (a << 1));
System.out.println("a >> 1: " + (a >> 1));
System.out.println("a >>> 1: " + (a >>> 1));

// Assignment operators
c = a;
System.out.println("c = a: " + c);
c += a;
System.out.println("c += a: " + c);
c -= a;
System.out.println("c -= a: " + c);
c *= a;
System.out.println("c *= a: " + c);
c /= a;
System.out.println("c /= a: " + c);
c %= a;
System.out.println("c %= a: " + c);
c &= a;
System.out.println("c &= a: " + c);
c ^= a;
System.out.println("c ^= a: " + c);
c |= a;
System.out.println("c |= a: " + c);
}
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
ceStorage\\693b2ac8aa2bac9d61fc6a23765304b0\\redhat.java\\jdt_ws\\DA-1_b95285c5\\bin C
Enter 2 numbers
4
5
Sum: 9
Difference: -1
Product: 20
Quotient: 0
Remainder: 4
a > b: false
a < b: true
a >= b: false
a <= b: true
a == b: false
a != b: true
a > 0 && b > 0: true
a > 0 || b > 0: true
!(a > 0): false
a & b: 4
a | b: 5
a ^ b: 1
~a: -5
a << 1: 8
a >> 1: 2
a >>> 1: 2
c = a: 4
c += a: 8
c -= a: 4
c *= a: 16
c /= a: 4
c %= a: 0
c &= a: 0
c ^= a: 4
c |= a: 4
```

21. Swapping using bitwise operations

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class Swapping {
    public static void main(String[] args) {
        int a = 10, b = 20;
        System.out.println("Before Swapping: a = " + a + " b = " + b);

        a = a ^ b;
        b = a ^ b;
        a = a ^ b;
        System.out.println("After Swapping: a = " + a + " b = " + b);
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
$ /usr/bin/env C:\Program Files\Java\jdk-11.0.11\bin\java.exe
a23765304b0\redhat.java\jdt_ws\DA-1_b95285c5\bin Swapping
Before Swapping: a = 10 b = 20
After Swapping: a = 20 b = 10
```

22. Store 2 numbers in a single byte

CODE

```
// JAVA DA - 1
// by Dhruv Rajeshkumar Shah
// 21BCE0611

public class TwoNumbersOneByte {
    public static void main(String[] args) {
        byte a = 9;
        byte b = 12;

        byte c;
        c = (byte) (a << 4);
        c = (byte) (c | b);

        System.out.println((c & 0b11110000) >> 4);
        System.out.println(c & 0b00001111);
    }
}
```

OUTPUT

```
dhruv@Titan /c/Dhruv/VIT/Semester-3/Java/Lab/DA-1 (main)
ceStorage\\693b2ac8aa2bac9d61fc6a23765304b0\\redhat.java\\jd
9
12
```